

## **Dr. Stefano Nerozzi**

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### **Research work and interests:**

I am the Science PI on a selected NASA Mars Data Analysis Program proposal to study the fluvial and volcanic history of outflow channel systems in Utopia Planitia, Mars. This project integrates several remote sensing techniques to unravel the history of landforms shaped by ancient water flows and interactions between volcanic processes and ground ice.

My past postdoctoral research work at UT Austin involved processing and analysis of Gamma Ray Spectrometer elemental concentration data from Mars Odyssey to reveal possible formation mechanisms of boulder halos and their spatial relationship with mapped geologic units and terrain surface composition.

My doctoral research focused on constraining which driving forces and surface processes are responsible for the initial emplacement of the north polar cap of Mars in the Late Amazonian. This work included stratigraphy and morphology mapping via orbital radar and high-resolution imagery, and climate modeling with general circulation models.

My other interests include the design and construction of electronic measurement devices for geophysical application on field sites, such as ground temperature profilers and 3D seismometers for seismic tremor studies.

### **Education:**

#### **Ph.D. Geological Sciences**

Aug 2014 – Aug 2019

University of Texas at Austin, TX, USA. Advisor: Dr. John Holt

GPA: 4.00/4.00

#### **M.Sc. Geology and Land Management**

Oct 2011 – Mar 2014

University of Bologna, Italy. Advisors: Dr. John Holt, Dr. Alessandro Amorosi

GPA: 3.93/4.00, Final grade: 110/110 cum laude

#### **B.S. Geological Sciences**

Oct 2008 – Oct 2011

University of Bologna, Italy. Advisor: Dr. Francesco Mulargia

GPA: 3.89/4.00, Final grade: 110/110 cum laude

### **Research funding:**

#### **Science PI**

2019 – 2022

Investigating Magma-Cryosphere Interactions and Outflow Channel Activity in Hebrus Valles, NASA Mars Data Analysis Program (MDAP), \$384,783.

### **Academic and research work experience:**

Postdoctoral Research Associate Jan 2020 - present  
Geologic mapping, sounding radar data analysis, and impact crater statistical and morphological study of the fluvial and volcanic history of Hebrus Valles and Hephaestus Fossae, Utopia Planitia, Mars.

Research Collaborator Dec 2019 - present  
Subsurface radar mapping of Terra Cimmeria quadrant on Mars for the Subsurface Water Ice Mapping 2.0 (SWIM 2.0) project.

Postdoctoral Fellow, Institute for Geophysics, UT Austin Sep 2019 – present  
Processing and analysis of Mars Odyssey Gamma Ray Spectrometer elemental concentration maps in relation to the spatial distribution of boulder halo sites on Mars.

Graduate Research Assistant, Institute for Geophysics, UT Austin Sep 2015 – Aug 2019  
Analysis of orbital radar sounding profiles (SHARAD), high-resolution imagery (HiRISE, CTX) and global circulation models (LMD GCM) to reveal the recent history of Planum Boreum on Mars (PhD project).

Teaching Assistant, Jackson School of Geosciences, UT Austin Sep 2016 – May 2017  
GEO303 – Intro to Geology – Fall 2016: Taught 3 weekly lab sessions of 2 hours each to a total of 50 non-geoscience-major students, administered quizzes and midterm exams, graded homework.  
GEO325J & GEO391 – Intro to Geoscience Computation – Spring 2017: Assisted undergraduate and graduate students during Matlab lab sessions, graded homework.

Lab Assistant I, Institute for Geophysics, UT Austin Jun 2013 – Nov 2013  
Analysis of orbital radar sounding profiles (SHARAD) to reveal the early evolution of the North Polar Layered Deposits on Mars (M.Sc. project).

Undergraduate Research Assistant, Institute for Geophysics, UT Austin Sep 2012 – May 2013  
Analysis of orbital radar sounding profiles (SHARAD) to reveal the early evolution of the North Polar Layered Deposits on Mars (M.Sc. project).

### **Publications:**

Bramson, A. M., Petersen, E. I., Bain, Z. M., Perry, M. R., **Nerozzi, S.**, and others, *in preparation*, Mars Subsurface Water Ice Mapping (SWIM) Project: Radar Subsurface Reflectors.

**Nerozzi, S.**, Tober, B.S., Ortiz, M.R., Holt, J.W., and Hamilton, C., *in preparation*, Revealing the history of Hebrus Valles and Hephaestus Fossae with SHARAD.

**Nerozzi, S.**, Ortiz, M. R., Holt, J.W., *in review*, The north polar basal unit of Mars: An Amazonian record of surface processes and climate events, *Icarus*.

Ojha, L., Karimi, S., Buffo, J., **Nerozzi, S.**, Holt, J.W., Smrekar, S., and Chevrier, V. Martian Mantle Heat Flow Estimate from the Lack of Lithospheric Flexure in the South Pole of Mars:

Implications for Planetary Evolution and Basal Melting, *Geophysical Research Letters*, p. e2020GL091409, doi:10.1029/2020GL091409.

Ojha, L., **Nerozzi, S.**, and Lewis, K., 2019, Compositional Constraints on the North Polar Cap of Mars from Gravity and Topography: *Geophysical Research Letters*, doi:10.1029/2019GL082294.

**Nerozzi, S.**, and Holt, J.W., 2019, Buried ice and sand caps at the north pole of Mars: revealing a record of climate change in the cavi unit with SHARAD: *Geophysical Research Letters*, doi:10.1029/2019GL082114.

**Nerozzi, S.**, and Holt, J.W., 2018, Earliest Accumulation History of the North Polar Layered Deposits, Mars from SHARAD, *Icarus*. doi:10.1016/j.icarus.2017.05.027

Guallini, L., and **Nerozzi, S.**, 2014, Polar Layered Deposits, *in Encyclopedia of Planetary Landforms*, Springer New York, p. 1–14.

### **Oral Presentations:**

**Nerozzi, S.**, Holt, J.W., Forget, F., Spiga, A., Millour, E., 2020, The Basal Unit: An Amazonian Record of Mars' North Polar History, *in 51st Lunar and Planetary Science Conference*, Abstract #2461.

**Nerozzi, S.**, Holt, J.W., Forget, F., Spiga, A., Millour, E., 2020, The Early History of Planum Boreum: An Interplay of Water Ice and Sand, *in Seventh Mars Polar Science Conference*, Abstract #6064.

**Nerozzi, S.**, Holt, J.W., Forget, F., Spiga, A., Millour, E., 2019, Reconstructing the Climate-Driven Evolution of Planum Boreum with Sounding Radar, Visible Imagery and General Circulation Models, *in Ninth International Conference on Mars*, Abstract #6433.

**Nerozzi, S.**, Holt, 2019, Buried ice and sand caps at the north pole of Mars: revealing a record of climate change in the cavi unit with SHARAD, *in IGS - International Symposium on Five Decades of Radioglaciology*, Abstract #81A3036.

**Nerozzi, S.**, Holt, J.W., Forget, F., Spiga, A., Millour, E., 2019, Combining Radar Sounding and General Circulation Models to Reveal the Initial Accumulation of the Martian North Polar Layered Deposits, *in 50<sup>th</sup> Lunar and Planetary Science Conference*, Abstract #2854.

**Nerozzi, S.**, and Holt, J.W., 2018, Revealing the History of Polar Ice Caps within the Planum Boreum Cavi Unit with SHARAD, *in 2018 Late Mars Workshop*, LPI Contrib. 2088, #5008.

**Nerozzi, S.**, and Holt, J.W., 2018, The Ice and Sand Caps at the North Pole of Mars: Discovering a “Lost” Record of Climate Changes, *in 2018 Mars Workshop on Amazonian Climate*, LPI Contrib. 2086, #4022.

**Nerozzi, S.**, and Holt, J.W., 2018, Ice caps under sand caps under an ice cap: revealing a record of climate change on Mars with SHARAD, *in 49<sup>th</sup> Lunar and Planetary Science Conference*, Abstract #1075.

**Nerozzi, S.**, and Holt, J.W., 2017, Newly Mapped Extent, Morphology, and Internal Stratigraphy of the Martian North Polar Cavi Unit, *in 48<sup>th</sup> Lunar and Planetary Science Conference*, Abstract # 1722.

**Nerozzi, S.,** and Holt, J.W., 2016, Stratigraphic Reconstruction of the Cavi Unit-NPLD Transition with SHARAD, *in* The 6th International Conference on Mars Polar Science and Exploration, Abstract # 6080.

**Nerozzi, S.,** and Holt, J.W., 2016, Reconstructing the Initial Emplacement of the North Polar Layered Deposits, Mars with SHARAD, *in* 47<sup>th</sup> Lunar and Planetary Science Conference, Abstract # 2265.

**Nerozzi, S.,** and Holt, J.W., 2015, Stratigraphic Structures and Depositional Patterns of the Lowermost NPLD, Mars, from SHARAD Mapping, *in* 46<sup>th</sup> Lunar and Planetary Science Conference, Abstract # 1670.

### **Awards:**

<i>Best Seminar – UTIG Brown Bag</i> , Institute for Geophysics, University of Texas at Austin	2019
<i>Mars Student Travel Grant</i> , Mars Exploration Program	Aug 2018
<i>Mars Student Travel Grant</i> , Mars Exploration Program	Apr 2018
<i>Graduate School Summer 2018 Fellowship</i> , University of Texas at Austin	2018
<i>Endowed Presidential Scholarship</i> , University of Texas at Austin	2017
<i>Global Research Fellowship</i> , University of Texas at Austin	2016
<i>Travel grant for 6<sup>th</sup> Mars Polar Science Conference</i> , European Geosciences Union (EGU)	2016
<i>Jackson School of Geosciences Entry Fellowship</i> , University of Texas at Austin	2014
<i>Outstanding Student Poster Award</i> , European Geosciences Union (EGU)	2014
<i>TASSEP scholarship</i> , University of Bologna	2012
<i>Certificate of Merit, Prof. Ivano Dionigi</i> , Chancellor of the University of Bologna	2012
<i>Certificate of Merit, Prof. Ivano Dionigi</i> , Chancellor of the University of Bologna	2010

### **Other professional experience:**

NASA Planetary Science Summer Seminar May 2019 – Aug 2019  
End-to-end design of a mission to an interstellar object. Responsibilities: UV-VIS spectrometer instrument lead, Team X telecom chair, geology and geophysics science group member.

### **Mentorship:**

Undergraduate research May 2019 – present  
Maya Ortiz, research topics: *Orbital imaging data processing and geological mapping of the north polar basal unit on Mars, Mars imaging data (CTX, THEMIS) selection and processing with USGS ISIS3 and NASA Ames Stereo Pipeline.*

Honors B.S. thesis December 2017 – May 2019  
Michael Christoffersen, thesis title: *Applying a Mass Balance Approach to Constrain Ice Thickness of Hubbard Glacier.*

Guided research project (GEO 371C) September 2016 – May 2017  
Christopher Eason, research topic: *Geological mapping of the north polar basal unit on Mars.*

### **Outreach activities and relevant learning experiences:**

AP Research Project Mentor Oct 2016 – April 2017  
AP Research project by H. Kansara at Carnegie Vanguard High School, Houston, TX. Research topic: *How Would Terraforming Mars Question Society's Morals according to the Utilitarian Approach?*

UT Science Olympiad Regional Tournament Feb 2018  
Prepared a test on Remote Sensing and Meteorology and served as a proctor for the regional tournament at UT Austin.

Science Communication Workshop Feb 2019  
Learning to overcome communication barriers, exploring different perspectives, identifying jargon, finding points of connection, optimizing short speeches, visualizing science, science in social media, STEMprov.

### **Leadership:**

UT Amateur Radio Club - President Jan 2018 – Apr 2019  
Manage club activities and meetings, teach licensing classes, define club goals, recruiting, and treasury. Club member since Jan 2015, officer since Sep 2016.

### **Field experience & Internships:**

TDEM, GPR, passive seismic soundings on debris covered glacier, Absaroka Range, WY	2015
Remote sensing and geomorphology of volcanic fields, aeolian dune fields and alluvial fans, NV & CA	2016
TDEM and GPR soundings on debris covered glacier, Absaroka Range, WY	2015
TDEM soundings on debris covered glacier, Wrangell-St. Elias Mtns., AK	2014
GPR and LIDAR surveys on debris covered glacier, Uinta Mtns., UT	2013
Carbonate sequence stratigraphy, Guadalupe Mtns., TX & NM	2013
ER, FDEM, GPR, and gravimetric surveys on karst area, Austin, TX	2012
Carbonate stratigraphy and geological mapping, Western Sicily, Italy	2012
Rock mechanics, stratigraphic logging and geological mapping, Central Alps, Italy	2011
Internship: Seabed bathymetry, navigation planning on research vessel Maria Grazia, Southern Adriatic Sea, Italy	2011
Stratigraphic logging and geological mapping, Central Alps, Italy	2010

### **Skills:**

#### Research & Industry

Geology (geological mapping, geomorphology, stratigraphy), geophysics and remote sensing (sounding radar, multispectral imaging, passive seismic techniques, time-domain EM, gravity, electrical resistivity), electronic circuit design, HF antenna design and construction.

### Computer & Software

Linux and Windows operating systems, ArcGIS, Landmark DecisionSpace, JMARS, USGS ISIS3, NASA Ames Stereo Pipeline, LMD General Circulation Model, Matlab, Illustrator, Photoshop.

### Professional

Visualization, analysis and interpretation of spatial datasets, delineation of scientific goals with holistic perspective, teamwork and collaboration, critical thinking, proposal writing, mentoring.

### Languages:

English – fluent / full professional proficiency

Italian – native